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Effects of Social Support and Personal Coping Resources on Mortality in Older Age: The Longitudinal Aging Study Amsterdam

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This study focuses on the role of social support and personal coping resources in relation to mortality among older persons in the Netherlands. Data are from a sample of 2,829 noninstitutionalized people aged between 55 and 85 years who took part in the Longitudinal Aging Study Amsterdam in 1992–1995. Social support was operationally defined by structural, functional, and perceived aspects, and personal coping resources included measures of mastery, self-efficacy, and self-esteem. Mortality data were obtained during a follow-up of 29 months, on average. Cox proportional hazards regression models revealed that having fewer feelings of loneliness and greater feelings of mastery are directly associated with a reduced mortality risk when age, sex, chronic diseases, use of alcohol, smoking, self-rated health, and functional limitations are controlled for. In addition, persons who received a moderate level of emotional support (odds ratio (OR) = 0.49, 95% confidence interval (CI) 0.33–0.72) and those who received a high level of support (OR = 0.68, 95% CI 0.47–0.98) had reduced mortality risks when compared with persons who received a low level of emotional support. Receipt of a high level of instrumental support was related to a higher risk of death (OR = 1.74, 95% CI 1.12–2.69). Interaction between disease status and social support or personal coping resources on mortality could not be demonstrated. *Am J Epidemiol* 1997;146:510–19.

aged; chronic disease; mortality; prospective studies; self concept; social environment; social support

The relation between social support and health has been of great scientific interest for many years. Several epidemiologic studies have pointed out the importance of social support for morbidity and mortality (1). For mortality, there are consistent indications of a lower risk of death among people with a large social network (2–4). This beneficial effect is confirmed for several causes of death, including cancer, coronary heart disease, and other cardiovascular diseases (5, 6).

The mechanisms through which social support influences health are unclear. Pathways suggested are through access to care and health practices (7, 8), through the social regulation of health behavior such as smoking and drinking habits (9), and through the provision of informational and tangible resources, such as economic aid, housing, and transportation (7, 10). Another proposed mechanism is psychobiologically based through influencing the neuroendocrine and immune systems (8, 11, 12).

All pathways mentioned fit into two different theoretical models, which are usually distinguished in the social support literature. First, the "direct-effect model" assumes that social support has a direct beneficial effect on health, regardless of whether stress is present or not (13, 14). Second, according to the "stress-buffer model" (14, 15), social support may act additionally as a buffer, mitigating the negative impact of stressors on health. Since the presence of a chronic disease is known to be a major stressor for physical and psychosocial functioning of older persons (16, 17), it is possible that disease status and social support interact to influence mortality. Although sociologists interpret an interaction effect in terms of a buffer effect of social support, this effect could be interpreted in epidemiologic terms as an impact upon case-fatality, i.e., social support may decrease case fatality for a specific disease.

So far, mortality studies have focused only on the direct effects of social support, irrespective of disease

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Abbreviations: CI, confidence interval; LASA, Longitudinal Aging Study Amsterdam; LR, likelihood ratio; LSN, "Living Arrangements and Social Networks of Older Adults"; OR, odds ratio.

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status. Although interaction effects of social support and chronic diseases are found for several health outcomes, such as physical and psychologic functioning (18–20) and utilization of health services (21), they have not yet been examined for mortality. Hence, our understanding of the linkages between disease status, social support, and mortality can be increased by distinguishing between the direct and interactive, buffering effects of social support on mortality.

A further clarification of the association between social support and mortality can be obtained by treating social support as a multidimensional construct. Most epidemiologic studies have examined the structural aspects of social support, such as the size and composition of the social network. However, as generally conceptualized, social support also encompasses other dimensions (10, 22). These other dimensions, i.e., the actual receipt of support and the perception of support, have seldom been examined in population-based mortality studies. Furthermore, researchers who have included various dimensions often combined them in aggregated measures. This could be legitimate if each dimension had a similar effect on mortality, but this may not be the case. For example, among men, an increased risk of death has been found for aspects such as having few friends, being unmarried, and receiving help with daily chores around the house, but not for the satisfaction with the support or receiving emotional support (23). Blazer (24) found that perceived social support was a much better predictor of mortality than structural aspects of the network.

Research examining coping resources that may influence health has focused predominantly on social support. However, there are other coping resources that may affect health status as well. Researchers have found that people with low feelings of mastery, self-esteem, or self-efficacy had a higher risk of mental (18, 20, 25) and physical (26–28) disorders. Ways in which these personal coping resources may affect health resemble those suggested for social support. Personal coping resources may directly influence physiologic responses and health-related behavior (29). Furthermore, in conformity with the stress-buffer model, personal coping resources were found to moderate the adverse effects of stressors on mental well-being (20, 30–33). In spite of these observed associations, research into the effects of personal coping resources on mortality is limited. Only Kaplan et al. (34) found self-efficacy expectations to predict survival for patients with chronic obstructive pulmonary disease. Since we could not find reports of any other research in this field, it might be concluded that the effect of personal coping resources on mortality deserves further study.

Therefore, our study considers not only structural, functional, and perceived aspects of social support, but also personal coping resources, i.e., mastery, self-efficacy, and self-esteem. Their direct effects and interaction effects on mortality are examined in a large sample of elderly people in the Netherlands.

MATERIALS AND METHODS

Sample

The Longitudinal Aging Study Amsterdam (LASA) is a longitudinal study on the predictors and consequences of changes in well-being and autonomy in the elderly population (35). The cohort was originally recruited for the study "Living Arrangements and Social Networks of Older Adults" (LSN) (n = 3,805; response rate, 62.3 percent). A random sample, stratified by age and sex according to expected mortality at midterm (5 years), was drawn from the population registers of 11 municipalities in the Netherlands. Nonresponse in the LSN study was related to age ($p < 0.05$), with more nonresponse from the oldest-old persons because of physical or cognitive impairment. (For full details on the sampling procedure, see Broese van Groenou et al. (36)).

For LASA, the 3,805 LSN participants aged 55–85 years were approached again, and 3,107 (81.7 percent) took part in the face-to-face LASA interview. A total of 126 (3.3 percent) had died before being approached, 44 (1.2 percent) could not be contacted, 134 (3.5 percent) were too ill or cognitively impaired to be interviewed, and 394 (10.4 percent) were unwilling to participate due to lack of interest. Again, there was a decline in response with increasing age ($p < 0.001$). The LASA interview, conducted from September 1992 through September 1993, covered a broad spectrum of topics related to health and to social and psychologic functioning.

For these analyses, respondents who were institutionalized at baseline were excluded (n = 126) because their social support is not comparable with that of older people living independently. In addition, 136 participants were excluded because they were unable to complete the full interview. These subjects were older ($p < 0.001$) and more often had a chronic disease ($p < 0.01$) than did subjects who completed the full interview. Finally, because of incomplete data on disease status, a further 16 subjects were lost to subsequent analyses, leaving a study sample of 2,829.

Measures

Mortality. The mortality status for each respondent was traced through the registers of the municipalities in which the respondents were residents. The ascer-

tainment was 100 percent complete. All deaths that occurred between the baseline interview and July 1, 1995, were recorded. The follow-up period was 29 months, on average, with a range of 21–34 months.

Social support. Support was measured on the basis of three dimensions: 1) structural network characteristics, 2) functional receipt of support, and 3) perceived support. Structural characteristics of the social network included *partner status* and the *number of social relations*. For partner status, a positive score of one was assigned to respondents who either were married or had someone whom they considered to be their partner. The socially active relationships of a respondent were determined according to a procedure based on the method of Cochran et al. (37). Network members aged 18 years and older with whom the respondent maintained an important and regular relationship were identified in seven domains (people in the same household, children, other relatives, neighbors, work and study contacts, contacts in organizations, and other contacts). The social network size refers to the total number of persons nominated.

The functional receipt of support from social relationships was measured by the mean amount of instrumental and emotional support received from respondents' network members. Questions about receiving support were asked about 10 network members with whom contact was most frequent. To ensure comparable values of the support of respondents with and those without a partner, only the support within the nine relationships other than with the partner was considered for all respondents. The instrumental support received was measured by asking how often during the previous year the respondent had received help from a network member with daily chores around the house, such as preparing meals, cleaning the house, transportation, and small repairs. To measure emotional support received, respondents were asked how often during the previous year they had talked to a network member about personal experiences and feelings. Answer categories and values were: never (0), rarely (1), sometimes (2), and often (3). For both support questions, the mean of the support received from the nine relationships (or less, if fewer members were identified) was computed, ranging from zero (no or never supportive relationships) to three (all relationships often supportive). Since it might be of influence whether all network members are equally supportive or whether a couple or even one network member only is greatly supportive, the individuals' standard deviations on the emotional and instrumental support measures were computed. These variables reflect the diversity in the amount of support received by the various network members. However, since preliminary analyses showed no univariate or multivariate associations between these measures and mortality, they were not subsequently included in the analyses.

For perceived support, the respondent's sense of loneliness was measured. Loneliness is the unpleasant experience that occurs when a person's network of social relationships is perceived to be deficient, either quantitatively or qualitatively (38). Loneliness was measured by a scale developed by de Jong Gierveld and Kamphuis (39), which consists of five positive items assessing feelings of belonging and six negative items applying to aspects of missing relationships. The total range is from zero, indicating no loneliness, to 11, indicating severe loneliness. The scale has been used in several surveys and has proven to be a robust, reliable, and valid instrument (40), which was also confirmed in our sample (reliability coefficient = 0.83; Loevingers H = 0.34).

Personal coping resources. Personal coping resources are represented by three personal characteristics, i.e., mastery, self-efficacy, and self-esteem. Mastery was measured by an abbreviated five-item version of the Pearlin Mastery Scale and concerns the extent to which one regards one's life chances as being under one's own control in contrast to being fatalistically ruled (31). This scale, ranging from five to 25, with a higher score indicating greater mastery, had a reasonable reliability in our sample (Cronbach's alpha = 0.67).

Self-efficacy refers to personal judgments of how well a person can implement behavior in situations that involve novel, unpredictable, or stressful elements and was measured on the 12-item version of the General Self-efficacy Scale of Sherer et al. (41). Response categories ranged from one ("totally disagree") to five ("totally agree"). The total scale is not unidimensional, but consists of three subscales, which we used separately (Woodruff and Cashman (42)). The dimensions were "willingness to initiate behavior" (three items, Cronbach's alpha = 0.64), "persistence in the face of adversity" (four items, Cronbach's alpha = 0.65), and "willingness to expend effort in completing the behavior" (five items, Cronbach's alpha =0.63). For all subscales, a higher score indicates a higher level of perceived self-efficacy.

Self-esteem was assessed on the basis of the response to the statement "On the whole, I am satisfied with myself" (1 = "totally disagree," 2 = "disagree," 3 = "neither disagree nor agree," 4 = "agree," and 5 = "totally agree").

Disease status. The presence of chronic diseases was measured by asking the participants whether they had any of the following diseases: cardiac disease, peripheral atherosclerosis of the abdominal aorta or

the arteries of the lower limb, stroke, diabetes mellitus, lung disease (asthma or chronic obstructive pulmonary disease), malignant neoplasms and arthritis (rheumatoid arthritis or osteoarthritis), or "any other major chronic diseases," including gastrointestinal diseases, serious kidney diseases, serious back and neck problems, endocrine diseases, and neurologic diseases. The number of chronic diseases was calculated by summing up all specific diseases reported to be present.

Control variables. Since age, sex, and educational level have been shown to be confounding variables in earlier mortality studies (23, 43, 44), these variables were included in our study. Educational level was measured by the total number of years necessary to complete the indicated level. Physical health status was considered by a three-item questionnaire on functional limitations (45, 46). This measure, asking about the ability to walk up and down a 15-steps staircase without stopping, to use private or public transportation, and to cut one's own toenails, constituted the best scale out of a set of nine items in iterative reliability analyses conducted in our pilot study (Cronbach's alpha = 0.72). Subjective health status was considered by a measure of self-rated health (47). Smoking behavior was measured using a single item assessing use of cigarettes or tobacco, and the excessive consumption of alcohol was assessed by an index that takes frequency as well as quantity into account (48).

Analyses

Preliminary analyses indicated that the measures for emotional and instrumental support received were not linearly related to mortality. Consequently, respondents were divided into three categories of support: low ($0 \leq$ mean support received < 1), moderate ($1 \leq$ mean support received < 2), and high ($2 \leq$ mean support received ≤ 3). The direct effects of social support and personal coping resources on mortality were determined by Cox proportional hazards regression models, adjusted for the presence of specific chronic diseases, age, sex, and educational level. Since the effects of self-rated health, functional limitations, and health behaviors on mortality may be exerted partially through factors such as social support and self-esteem (9, 49, 50), these variables were included in the second step of analyses only.

In addition, interaction effects on mortality between social support and personal coping resources with chronic diseases were studied. First, since an increasing number of diseases is likely to be accompanied by an increasing level of stress, interaction with the number of chronic diseases was considered. For this purpose, the Cox proportional hazards model was extended with product terms between the number of chronic diseases and social support or personal coping resources, using the backward removal method ($p_{out} > 0.05$). To avoid multicollinearity between the first-order terms and the product terms, we formed the product terms by multiplying the centered (deviation from the mean) scores from the predictors of interest (51). Second, since specific diseases may represent different types of stress due to distinct disease characteristics (20, 52), interaction with the eight specific chronic diseases was studied. Although a hypothesis-driven approach for studying the interactions between specific diseases and coping resources would be preferred, the lack of earlier mortality studies on this topic did not make this possible. Consequently, our analyses included many interaction terms and provide only an initial, rather crude exploration of possible buffer effects.

RESULTS

Of the study sample of 2,829 respondents, 202 (7.1 percent) died during the follow-up period. Table 1 shows the baseline characteristics of the sample and their univariate associations with mortality. Owing to the stratified sampling procedure, men and women are fairly evenly represented, and the proportion of older-old people is relatively high. The high number of respondents with physical problems is a consequence of oversampling the older-old and illustrates that nonresponse has not resulted in a sample of "healthy older persons." In univariate analysis, significant predictors of mortality were age, sex, all specific chronic diseases except arthritis, excessive use of alcohol, physical limitations, and self-rated health.

Table 2 shows the univariate associations between the psychosocial coping resources and mortality. Partner status was not related to mortality. However, individuals with a large social network and those who reported less loneliness were less likely to die than those with a small social network and those feeling lonely. Receipt of a great deal of instrumental support was associated with an increased mortality risk, whereas receipt of a great deal of emotional support was associated with a decreased mortality risk. Of the personal coping resources, only mastery was inversely related to mortality: Those with greater feelings of mastery had a lower mortality risk.

Intercorrelations among the social support variables and among the personal coping resources were low. Correlations between social support variables did not exceed 0.30, and correlations between the personal coping resources were all below 0.33, except for the correlation between mastery and the self-efficacy subscale "persistence facing adversity" ($r = 0.55$). Because intercorrelations were not extremely high, the

TABLE 1. Percentage and number of persons who died, by baseline characteristics, The Longitudinal Aging Study Amsterdam, 1992–1995

Variable	Total no.	Persons who died		p value†
		%	No.	
Sex				
Men	1,377	9.4	130	***
Women	1,452	5.0	72	
Age (years)				
55–64	945	2.8	26	***
65–74	917	6.0	55	
75–84	967	12.5	121	
Education level (years)				
5–8	1,198	8.1	97	NS‡
9–13	1,297	6.1	79	
14–18	331	7.9	26	
Presence of specific diseases				
No disease	971	4.1	40	***
Cardiac disease	542	11.8	64	***
Atherosclerosis	262	13.0	34	***
Stroke	138	10.9	15	NS
Diabetes mellitus	205	18.0	37	***
Lung disease	316	13.3	42	***
Cancer	248	12.1	30	***
Arthritis	981	6.6	65	NS
Other major diseases	332	9.9	33	*
Smoking				
No	2,114	6.6	140	NS
Yes	608	8.1	49	
Use of alcohol				
No/moderate	2,281	6.3	144	**
Excessive	112	11.6	13	
Physical limitations				
No	1,684	4.7	79	***
Yes	1,041	10.6	110	
Self-rated health				
(Very) good	1,734	5.5	96	***
Fair/poor	991	9.4	93	

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
† Univariate associations with mortality.
‡ NS, not significant.

variables may be considered to be empirically distinct dimensions and, therefore, collinearity among the independent variables was not considered a major problem in the analyses.

Direct effects

Initially, direct effects were examined by using basic models separately for social support and for personal coping resources. After inclusion of age, sex, educational level, and all specific chronic diseases, entering the five social support variables significantly improved the Cox proportional hazards model (likelihood ratio (LR) test: $\chi^2 = 31.9$, df = 7, $p < 0.001$). However, when this procedure was repeated and all personal coping resources were entered, the improvement of the model was much less (LR test: $\chi^2 = 11.8$, df = 5, $p = 0.04$). This illustrates that the prediction of mortality by personal coping resources is less substantial than prediction by social support variables. The mortality risks found in these two separate models were virtually equal to those found in the model that included social support variables and personal coping resources simultaneously. Therefore, only the latter, integrated model is presented (table 3). However, it

TABLE 2. Percentage and number of persons who died, by social support variables and personal coping resources, The Longitudinal Aging Study Amsterdam, 1992–1995

Variable	Total no.	Persons who died		p value†
		%	No.	
Presence of partner				
No	871	8.3	72	NS‡
Yes	1,958	6.6	130	
Social network size (members)				
<8	726	9.6	70	**
8–14	1,057	6.5	69	
>14	1,005	5.5	55	
Instrumental support				
Low (<1)	1,685	6.2	105	**
Moderate (1–<2)	864	6.9	60	
High (≥2)	233	12.4	29	
Emotional support				
Low (<1)	446	13.0	58	***
Moderate (1–<2)	1,067	5.2	55	
High (≥2)	1,269	6.4	81	
Loneliness				
Low (0)	1,083	5.4	59	***
Moderate (1–2)	879	5.6	49	
High (≥3)	826	10.4	86	
Mastery				
<18	1,221	8.8	107	**
≥18	1,544	5.8	89	
Self-efficacy				
Willing to initiate behavior				
<8	1,191	7.5	89	NS
≥8	1,625	6.8	111	
Persistence facing adversity				
<15	1,333	6.8	90	NS
≥15	1,486	7.5	111	
Effort to complete behavior				
<20	1,201	6.7	81	NS
≥20	1,617	7.4	119	
Self-esteem				
Low (1–3)	496	8.7	43	NS
High (4, 5)	2,327	6.8	159	

** $p < 0.01$; *** $p < 0.001$.
† Univariate associations with mortality.
‡ NS, not significant.

should be noted that because of the larger number of variables included in the integrated model, the 95 percent confidence interval of the odds ratios for most variables in this model were slightly greater than in the separate models.

In the integrated model, three of the five social support variables were statistically significant predictors of mortality (table 3). People who received a high level of instrumental support had a twofold, significantly higher mortality risk (odds ratio (OR) = 1.87, 95 percent confidence interval (CI) 1.21–2.88) than did those who received a low level of instrumental support. The mortality risk was not significantly higher for people who received a moderate amount of instrumental support (OR = 1.13; 95 percent CI 0.81–1.57). Receipt of either moderate or high levels of emotional support decreased the likelihood of dying by approximately half (OR = 0.47, 95 percent CI 0.32–0.70 and OR = 0.67, 95 percent CI 0.47–0.98, respectively). Persons who reported greater loneliness

TABLE 3. Multivariate predictors of mortality (n = 2,722), The Longitudinal Aging Study Amsterdam, 1992–1995

Variable (with range)	Model 1		Model 2*	
	OR†	95% CI†	OR	95% CI
Control variables				
Age (55–85 years)	1.07	1.06–1.08	1.07	1.05–1.09
Sex (men = 0, women = 1)	0.64	0.45–0.90	0.67	0.46–0.96
Education level (5–18 years)	1.00	0.96–1.05	1.01	0.96–1.06
Specific diseases (absent = 0, present = 1)				
Cardiac disease	1.46	1.06–2.00	1.39	1.00–1.94
Atherosclerosis	1.39	0.94–2.07	1.26	0.84–1.90
Stroke	0.51	0.26–0.98	0.46	0.24–0.89
Diabetes mellitus	2.39	1.63–3.52	2.23	1.51–3.32
Lung disease	1.56	1.09–2.24	1.43	0.98–2.07
Cancer	1.71	1.13–2.58	1.63	1.07–2.47
Arthritis	0.80	0.58–1.10	0.72	0.52–1.01
Other major diseases	1.41	0.95–2.09	1.33	0.89–1.98
Physical limitations (0 = no, 3 = many)			1.17	0.99–1.38
Self-rated health (0 = very good, 4 = poor)			1.12	0.92–1.37
Alcohol use (0 = no/moderate, 1 = excessive)			2.20	1.22–3.99
Smoking (no = 0, yes = 1)			1.25	0.88–1.78
Social support				
Partner (no = 0, yes = 1)	1.21	0.85–1.72	1.31	0.90–1.87
Network size (0–75)	0.99	0.97–1.01	0.99	0.97–1.01
Instrumental support‡				
Moderate	1.13	0.81–1.57	1.09	0.78–1.51
High	1.87	1.21–2.88	1.74	1.12–2.69
Emotional support‡				
Moderate	0.47	0.32–0.70	0.49	0.33–0.72
High	0.67	0.47–0.98	0.68	0.47–0.98
Loneliness (0–11)	1.06	1.00–1.12	1.06	1.00–1.12
Personal coping resources				
Mastery (5–25)	0.93	0.89–0.98	0.94	0.89–0.99
Self-efficacy				
Willing to initiate behavior (3–15)	1.01	0.95–1.08	1.01	0.95–1.08
Persistence facing adversity (4–20)	1.07	0.99–1.14	1.07	0.99–1.14
Effort to complete behavior (5–25)	1.01	0.95–1.07	1.02	0.96–1.08
Self-esteem (1–5)	0.91	0.76–1.08	0.94	0.79–1.13
Model χ^2	213.2; $p < 0.001$		230.5; $p < 0.001$	

* Additional adjustment for physical limitations, self-rated health, alcohol use, and smoking.
† OR, odds ratio; CI, confidence interval.
‡ Reference category is "low support."

were more likely to die (for each point of increase on the loneliness scale, OR = 1.06, 95 percent CI 1.00–1.12). This implies, for instance, that those with the highest loneliness score have a 1.89-fold higher risk of death than do those with the lowest score ($e^{11\times0.0579(=b)} = 1.89$). Although network size was inversely associated with mortality in the univariate analysis, the association disappeared in the multivariate analysis.

Similarly to the univariate analyses, in multivariate analysis, self-esteem and all three subscales of self-efficacy were unrelated to mortality. The only significant association with mortality was found for mastery. People with greater feelings of mastery had a decreased risk of mortality (for each point of increase on the mastery scale: OR = 0.93, 95 percent CI 0.89–0.98). This implies that those scoring at the highest decile of the mastery scale (score = 12) have a 0.57-fold lower risk of death than do those scoring at the lowest decile (score = 20) ($e^{8\times-0.0692(=b)} = 0.57$).

Additional adjustment for physical limitations, self-rated health, smoking, and use of alcohol hardly changed the odds ratios found for social support and personal coping resources. Most mortality risks (odds ratios) did not increase or decrease by more than 0.03. The largest change was found for level of instrumental support (OR decreased from 1.87 to 1.78), but its predictive effect remained statistically significant.

Interaction effects

An initial exploration of interaction effects of social support was obtained by investigating whether inclusion of interaction terms between the five social support variables and the number of diseases significantly improved the basic model including all control, disease, and support variables. However, this was not the case: The extended model did not significantly improve the prediction of mortality (LR test: $\chi^2 = 2.3$, df = 7, $p = 0.94$). All interaction terms were removed from the model in the backward removal method ($p > 0.05$). Subsequently, buffer effects between the eight specific diseases and the five social support variables were explored. When all 40 possible interaction terms in both stepwise-entry and backward-removal methods were considered, none of the interaction terms remained in the basic model.

The exploration of interaction effects was also applied to personal coping resources. Again, the basic model, including all control and disease variables and personal coping resources, was not significantly improved by the inclusion of five interaction terms between personal coping resources and the number of chronic diseases (LR test: $\chi^2 = 2.8$, df = 5, $p = 0.73$). All interaction terms were removed in the backward removal method (all $p > 0.05$). Likewise, extending the basic model with the interaction terms between the eight specific diseases and personal coping resources did not give a significantly better prediction of mortality. Only two interaction terms remained in the model when forward-entry as well as backward-removal methods were used. However, this number of interaction terms equaled the anticipated number of terms on the basis of statistical chance. It has to be concluded that there is no evidence for any interaction effects between chronic diseases and social support or personal coping resources on mortality.

DISCUSSION

Although other community-based studies have shown a lack of social relationships to be related to a higher risk of death, most did not consider functional and perceived aspects of social support. Our study indicates that these aspects, in particular, may be critical predictors of death among community-dwelling elderly. Receipt of emotional support and fewer feelings of loneliness decreased the risk of death, whereas a high level of instrumental support was associated with a higher risk of death. Moreover, effects on mortality were not restricted to the realm of social support. Greater feelings of mastery, a personal coping resource, also reduced the risk of death. Thus, the extent to which a person considers life chances to be influenced by personal control has an effect on mortality. We are unaware of reports of other community-based research into the effects of personal coping resources on mortality. The effects found did not disappear when additional adjustment for physical limitations, self-rated health, smoking, and use of alcohol was included. This suggests that it is unlikely that emotional support, loneliness, and mastery exert their effects on mortality through physical and self-rated health status or health behavior.

For emotional support, our findings are in line with those of Berkman et al. (43), who found that for myocardial infarction patients lacking emotional support the mortality risk was almost three times higher in the subsequent 6 months. The increased mortality risk for receiving high instrumental support is also in line with earlier findings (23) and might be due to the fact that receiving instrumental support is closely related to the health-related need for such support.

Our findings do not appear to support the evidence in favor of an association between structural aspects of support and mortality, as found in a number of other studies (24, 53–57). Only in univariate, but not in multivariate, analyses was a large social network protective against health. This could be attributed to the fact that poor health is a determinant of a limited number of social contacts. Indeed, the lack of association between social network size and mortality after adjustment for baseline health status would seem to indicate this. For partner status, three other studies among aged populations also found no significant association for marital status (24, 53, 54). This supports the suggestion of Seeman et al. (55) that the adverse effects of not having a partner are less common in aged than in younger adults. Perhaps, through a process of anticipatory socialization, elderly people are able to prepare themselves for and to rehearse the bereaved role as their peers go through this experience (56).

Our results will contribute to the discussion on whether social support and personal coping resources have direct or interactive, buffering effects on mortality. According to Cohen and Wills (57), structural support measures are more likely to exhibit direct effects, whereas functional support measures will exhibit buffer effects in stressful situations. However, if chronic diseases are considered as stressors and mortality is considered as a health outcome, our study provides no evidence for the presence of any interactive, buffering effects of coping resources. Since effects of coping resources were not different for older persons without and those with (many) chronic diseases, the expectation that some coping resources may decrease case fatality for especially stressful disease

could not be confirmed. The fact that we found evidence only for direct effects may indicate that a lack of coping resources is a stressor, which, in itself, increases the risk of mortality. Results of other studies (11, 12) also suggest that a lack of coping resources causes individuals to judge events or situations in life as more stressful, which may directly increase mortality risk through influencing neurologic, hormonal, and immunologic control systems.

However, for several other health outcomes, such as psychologic and physical health, there is some evidence of interactive, buffering effects of social support and personal coping resources with chronic diseases (30, 32). In our study population, we also found interactive buffering effects for depressive symptoms when using the same instruments of coping resources (20, 33). This illustrates that the links between coping resources and psychologic health may be different from those between coping resources and mortality.

However, any conclusions about our findings on buffering effects should take into account some of the limitations of our study. First, nonresponse in our study was higher for the older and less-healthy subjects. Even though we oversampled in the oldest strata, the selective nonresponse may have weakened the association at issue. Second, the presence of acute diseases was not considered in our study. However, since acute diseases require a more immediate, intensive adaptation from both patient and social environment (53), buffering effects of coping resources might occur in these acute stressful situations. Third, the duration of follow-up was only 29 months. Because of this short follow-up period, the deaths that occurred might have concerned the seriously ill elderly in particular. However, when we included variables such as presence of comorbidity, self-rated health, and functional limitations in daily life, all of which give some indication of the severity of the affected health status, the significant associations found for coping resources did not disappear. These findings suggest that the severity of disease was not a major confounder of our results and does not explain the associations we found.

In all, our findings indicate that functional and perceived aspects of support were found to be more important risk factors for mortality than were structural support aspects. This confirms the importance of taking the multidimensionality of social support into account. In addition, we found evidence for the importance of mastery in relation to mortality. To increase our understanding of the impact of coping resources on health, future research should not focus on only one aspect of social support and should also investigate the role of personal coping resources in this respect.

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